# *Information Technology Meets Engineering & Transportation Planning*

Texas Department of Transportation

Dawn Doyle

NATMEC 2002

# Why STARS Exists ...

Get More From
Your Data

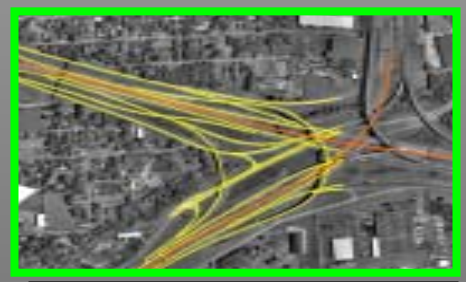

With the advent of new Traffic Monitoring and Pavement Design Guidelines, SHAs are urged to adapt to changing conditions, technology and information.

The bottom line is get better data and use it!


# TxDOT Response

Statewide Traffic Analysis and Reporting System … a multi-tiered client-server system to handle the counting, monitoring and analysis of Texas traffic. STARS, using a relational database management system, integrates a full suite of traffic and spatial data analysis tools designed to meet current and emerging traffic monitoring mandates and automation incorporating new technologies.

# What STARS is ...



ISD - On-system only
LRS/GAIP

TPP - GIS, TRM, RI

Analysts:Analyze
- Traffic Data
- Statistics
- Engineering
- Estimations
- Projections

Axle Counts
Vehicle Classification
Volume Counts
Cont. Veh. Class.
Vehicle Weight
Vehicle Speed

Traffic Data
Oracle
RDBMS

Web Access
for TxDOT and
external users

Software loads &
processes data!

# How STARS Will Come to Be ...

Or How to Successfully Build an Enterprise Database System

**Charles Darwin said,**

"It is not the strongest of the species that survives, nor the most intelligent, but those which are most adaptable."

STARS Forges New Ground!

# Price Pritchett said,

In the Information Age we must hold ourselves personally accountable for the success of the organization. We are its brains; its energy. We represent its only ability to cope with change. If we personally don't help protect the total organization, we can't expect it to survive for long.

# Strong Partnerships

***A Partnership providing project strength!***

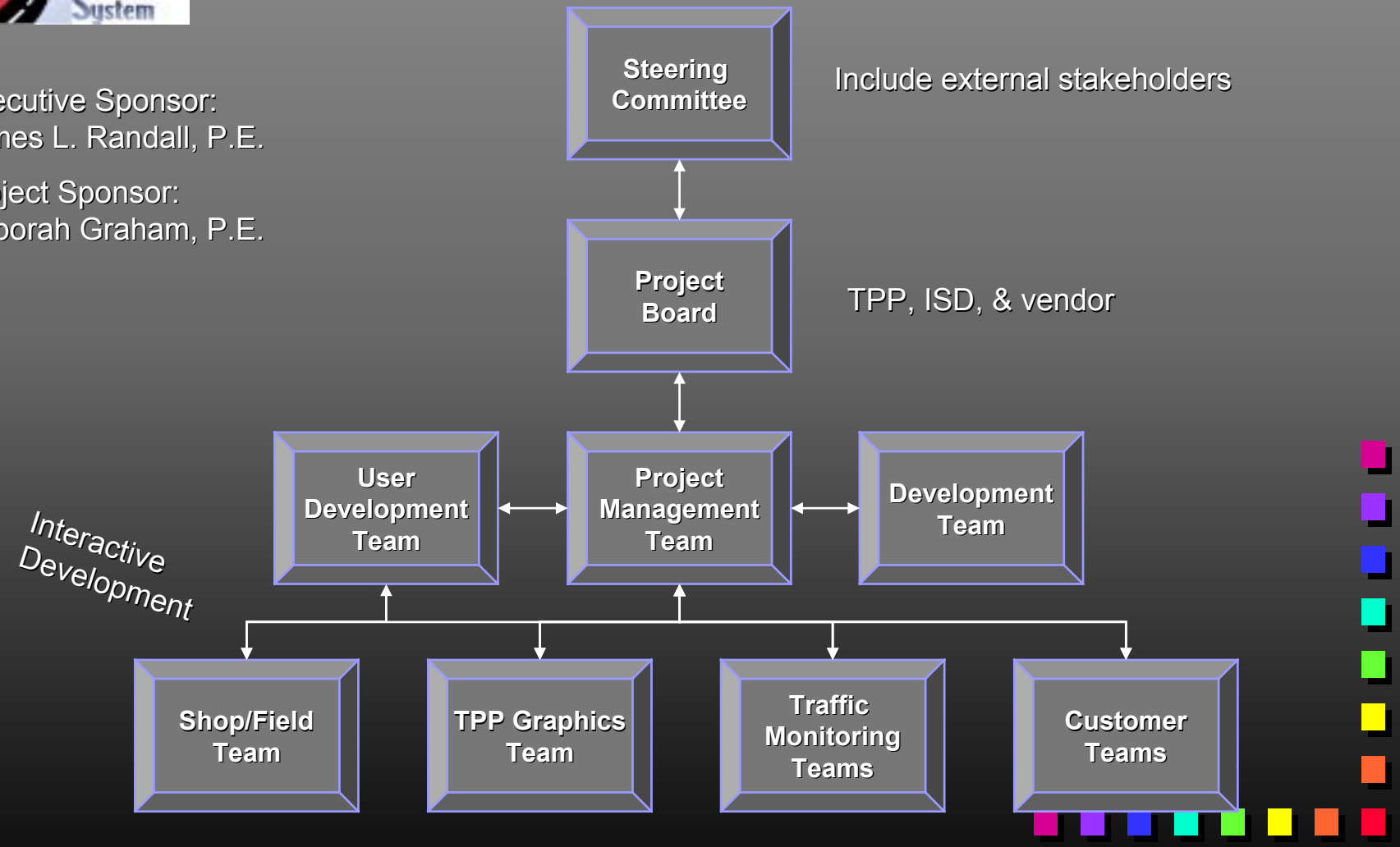
# Thorough Planning

- Project Management Plan
  - Create the business imperative
    - Clearly tie into agency objectives
    - Have project goals and objectives
- Joint Planning & Application Design
- Software Requirements Specifications
- Requirements Traceability Matrix
- Task-level Project Work Plan

# Strong Project Organization

Executive Sponsor:
James L. Randall, P.E.

Project Sponsor:
Deborah Graham, P.E.



# Project Risk Mitigation

**State of the practice project management**

- Joint planning conducted for each deliverable with delineated tasks, check points, milestones, and performance measures
- Rigorous and continuous product review
- Vendor works on-site
- Payment only on deliverable approval

# Bite-sized Releases

- Release 1.0
  - Traffic Analyst (historical, preliminary and final data)
- Release 2.0
  - Internal access; increase reporting and system functionality such as ramp balancing
- Release 3.0
  - Improve data input and sharing processes
- Release 4.0
  - External access

# Information Systems Participation

- Intensive commitment almost every step of the development process:
  - Mature Process (Capability Maturity Model)
  - System requirement specifications
  - Project work plan
  - Software development guidance & coordination/ compatibility with existing IT protocols & environments
  - Security
  - Quality assurance processes and product review
  - Intergovernmental liaison

# Project Risk Mitigation

**State of the practice project management**

- Iterative process accommodates knowledge acquired during development
- Re-engineers nine (9) legacy data analysis programs
- Re-engineers statistical formulae used in factor development and travel estimation, etc.

# Project Risk Mitigation

- Project Management
- Quality Assurance Plan
- Risk Assessment & Management Plan
- Critical Performance Criteria
- Change Control Plan
- Delineated Deliverables

# Project Risk Mitigation

**State of the practice project management**

- Each Deliverable is a Mini-product
- Deliverable Planning
  - Mobilization
    - Required Skill Sets
    - Tasks
    - Check Points
    - Milestones
    - Deliverable Charter
    - Information Resource Request (time, dates)
  - Deliverable kick-off meeting

# Project Risk Mitigation

- Interactive Deliverable Development
- Deliverable Review
- Deliverable Approval & Acceptance
- Deliverable Payment
- Deliverable Copyrighting

# Project Risks

- Absenteeism at meetings/work sessions
- Indecision or untimely internal decisions
- Mid-course changes in standard architecture, platforms, or operating systems, etc.
- TxDOT delays in completing its tasks

# What You Get for Your Investment

# Current System

Mainframe

Raw Data

Microsoft Excel

Microsoft Access

# STARS

## The Future

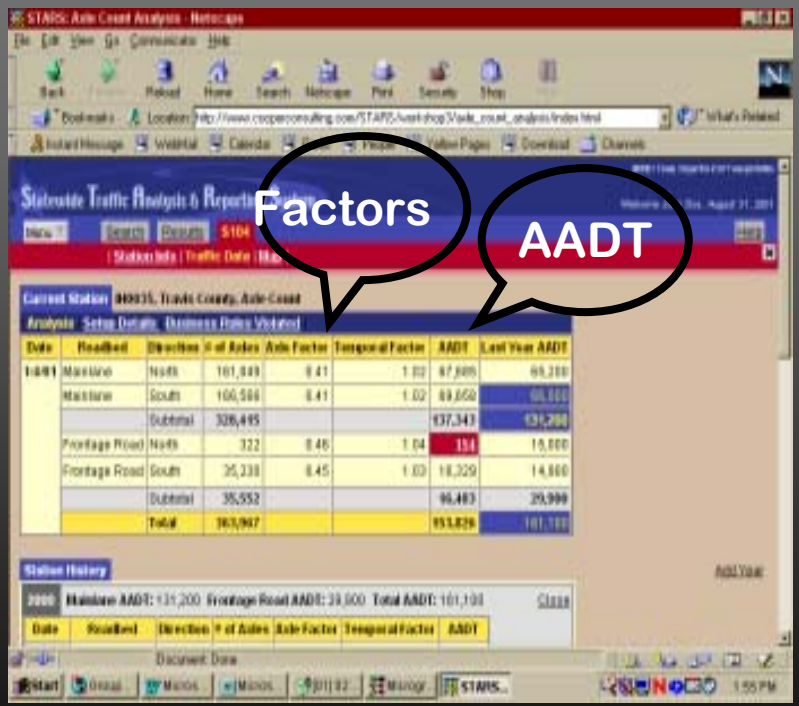
- Automate manual processes
- Collocate data into one relational database
- Improve statistical approaches
- Meet new reporting mandates
- Better interface w/ travel demand modeling & air quality determination
- Interface w/ GIS
- Better & easier reporting
- Ad Hoc Reports
- Customized statistical analysis
- New data sources:  ITS, cities, counties

# Traffic Analyst

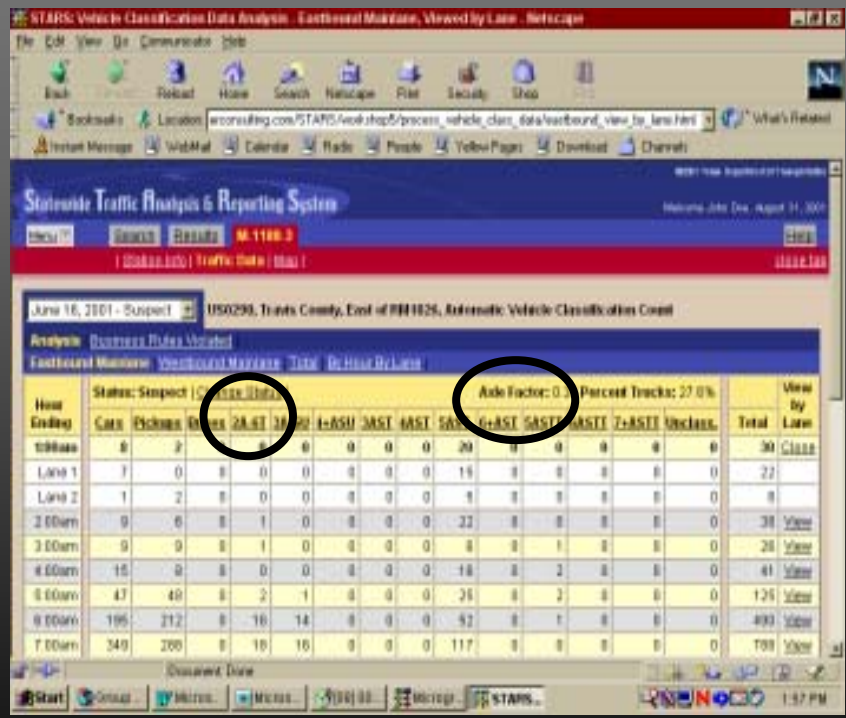
STARS Statewide Traffic Analysis & Reporting System

60% time savings

## Axle Count Analysis




## Vehicle Classification Analysis

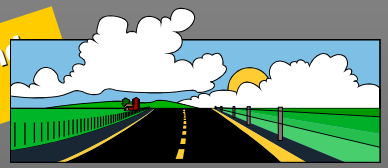


# Transportation Analyst

STARS Statewide Traffic Analysis & Reporting System

**Trade data - View maps!**

Travel Demand Model



SUPPLY
- Network (MPO task)
- Transit Alternatives

DEMAND
- Demographics (MPO task)
- Traffic Counts/ Travel Survey (TxDOT task)

| Highway Network | Traffic Assignment | Trip Table |
|---|---|---|

Outputs include future volumes & speeds per roadway


Air Quality

Travel Demand Model → VMT, Speed

Mobile 5 Model → Emissions Factors

Urban Air Shed Model/ Photochemical Model

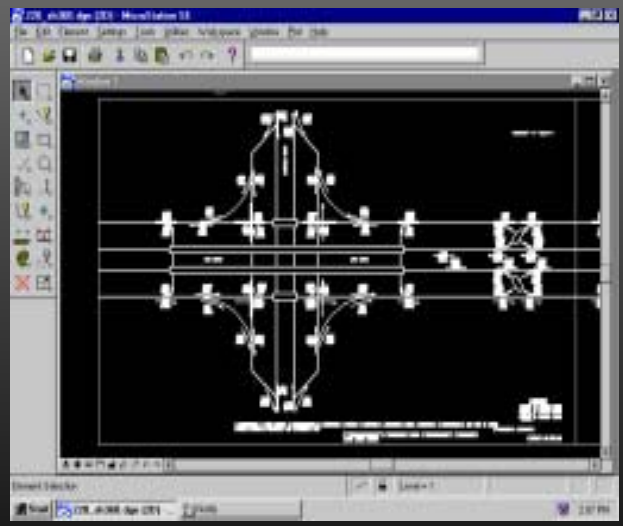
Emission Concentrations

Statewide Analysis Model

Latin American Truck Flows 2020

# TxDOT Engineers

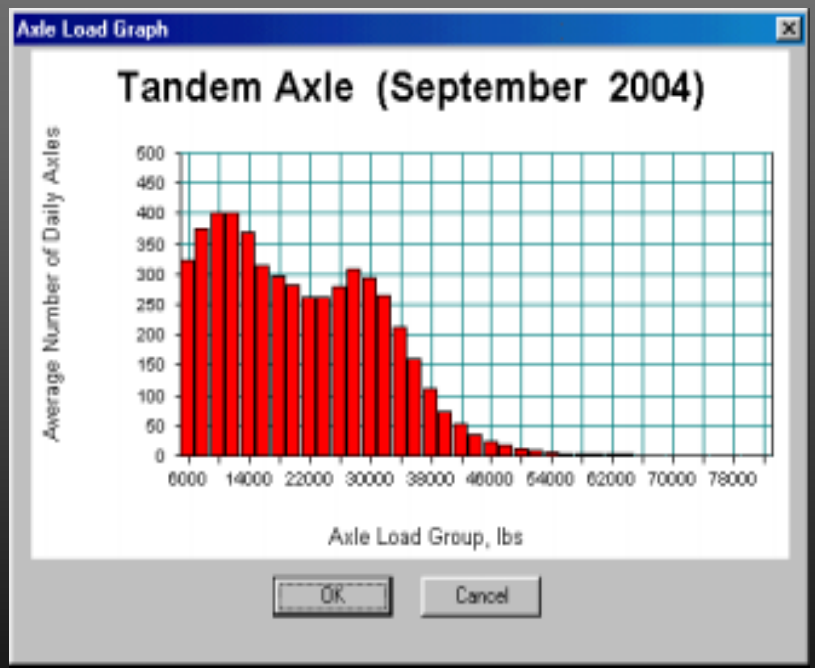
- Engineers have more accurate, consistent and project-specific traffic data needed for highway engineering decisions



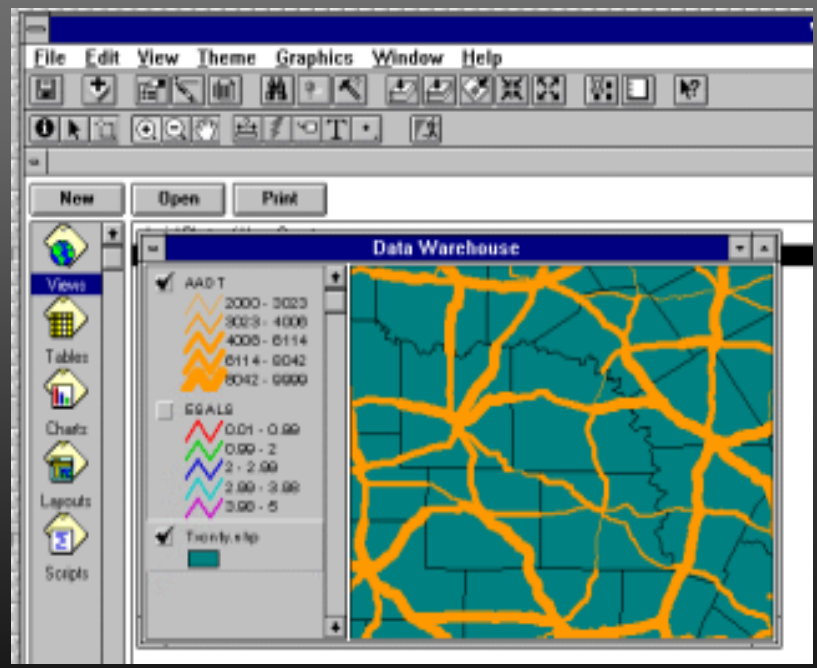
# TxDOT Engineers

## Accurate & Consistent Information

**Axle Load Spectra**



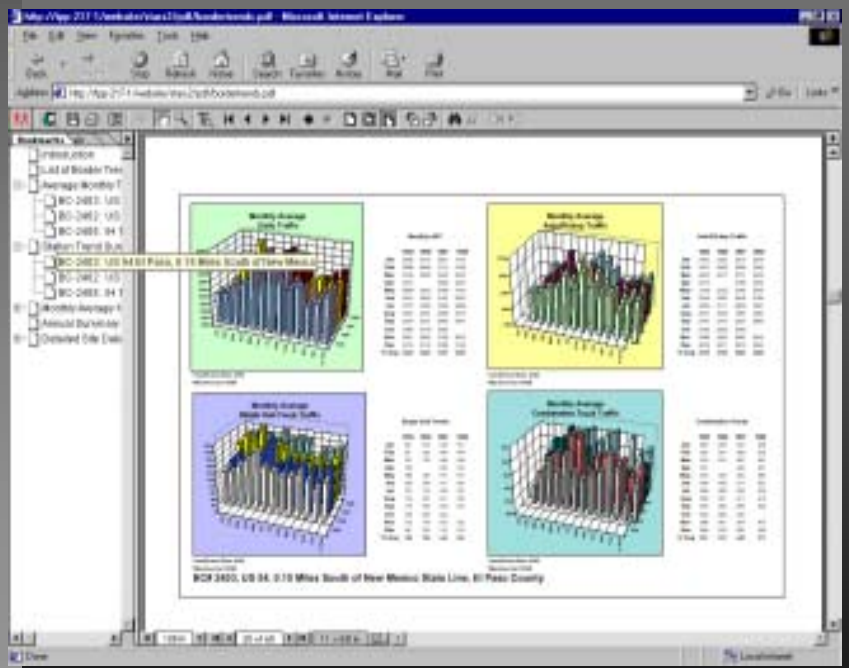

**Traffic Volume Flowband Map**



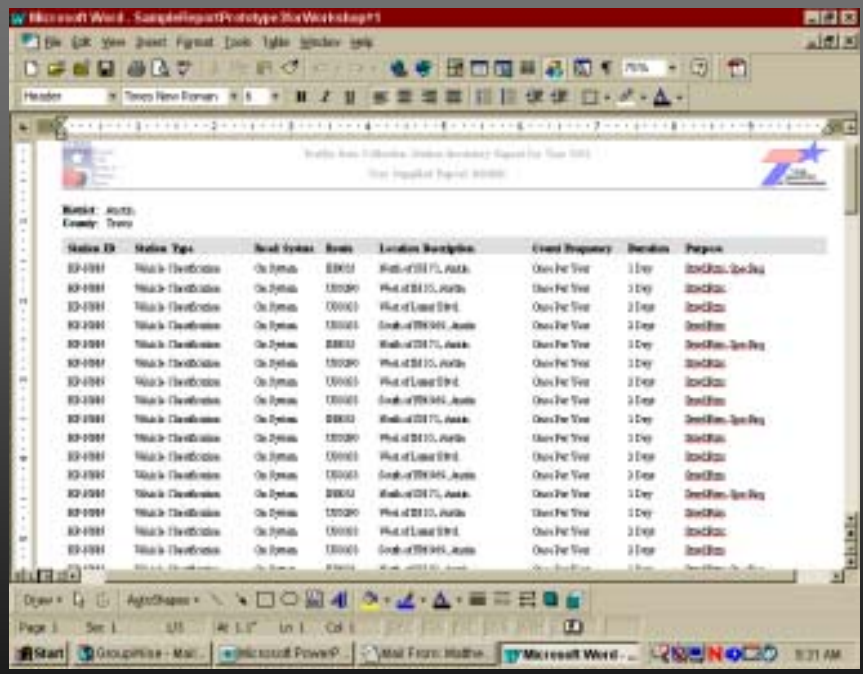
# Consultants

Cost Effective

## I-10 Border Crossing Vehicle Class



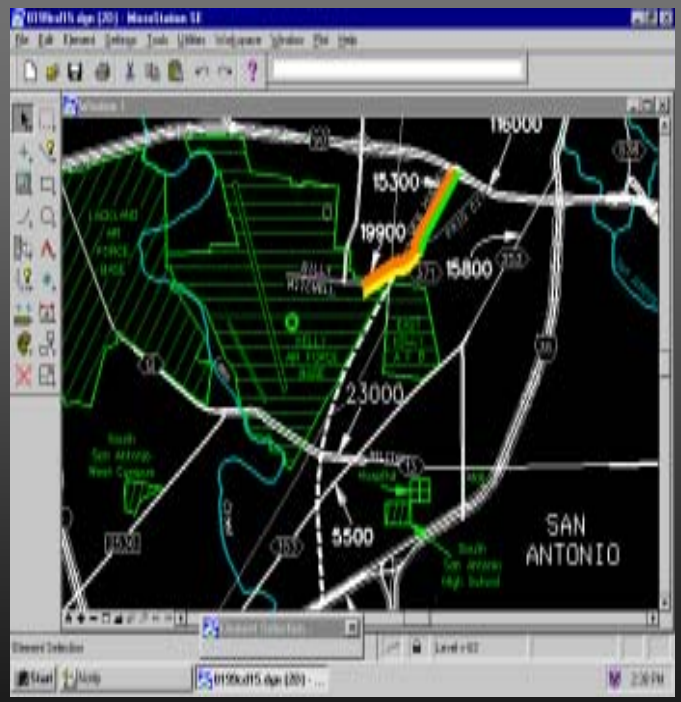
## Traffic Volume Data



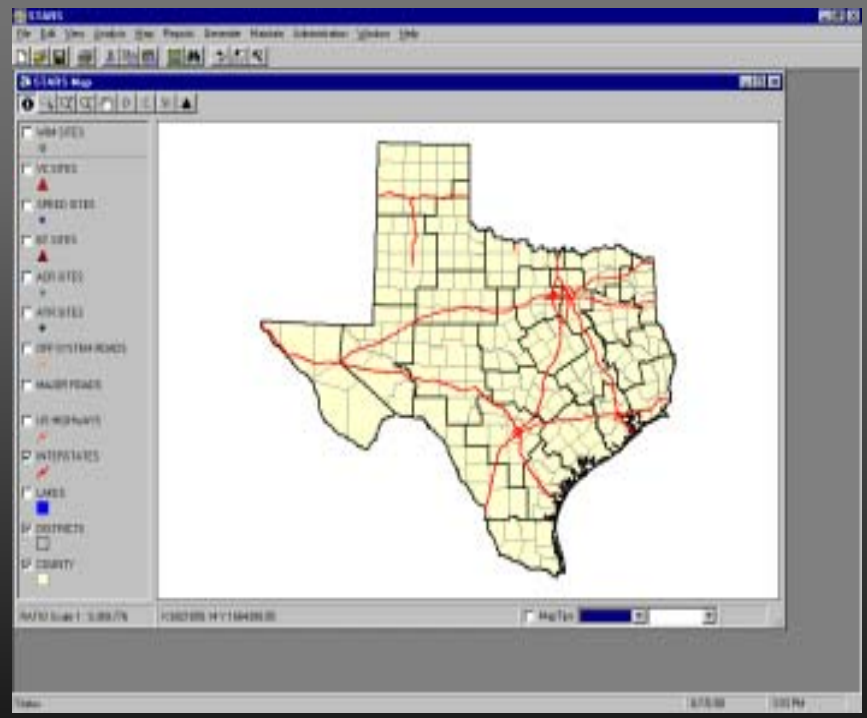
# Legislators

## Efficient - Help Yourself

### TxDOT Construction Map




### Interstate Attribute Map



# How STARS Works ...

# Architecture for Techies

- Web-based (XML language)
- Multi-tiered client-server
- Object-oriented
- Relational database
- ArcIMS
- Oracle 8i
- MS Windows.NET

# Costs for Accountants

| | | |
|---|---|---|
| *Start date:* 10/25/99 | $ 1,930,727 | Planning & Design - Phase I |
| *Start date:* 08/01/00 | $ 607,000 | Added JADs, & Risk Mgmt. |
| *Start date:* 09/01/01 | $ 1,813,469 | Increased TxDOT participation |
| *Start date:* ~ 11/16/2002 | $ 5,251,561 | Construction & Deployment - Phase 2 |

# Costs to Continue

- 4-5 FTE STARS Project Office
  - Transportation Planners (ad hoc crystal reporting)
  - database administrators
  - data analysts.
- Expansion of relational database management system capability

# Web Security Choices

- Users have predefined roles
- Security access is tied to the roles
- Security access defines the choices that a user sees as available on the Web screen.
  - Example:

    A legislator or a consultant has query rights (e.g., city) - but what appears is published data in a .pdf format